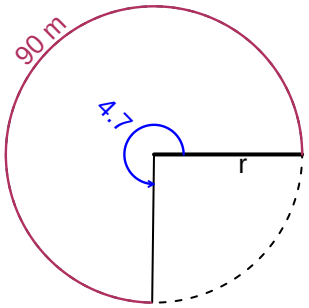
Name: Date:

Trig Final (SLTN v606)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 4.7 radians. The arc length is 90 meters. How long is the radius in meters?

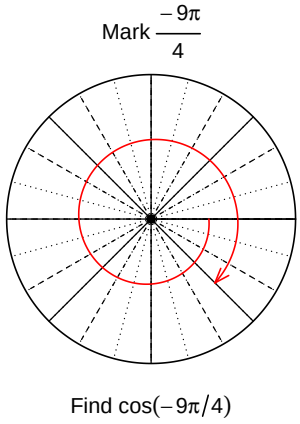


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

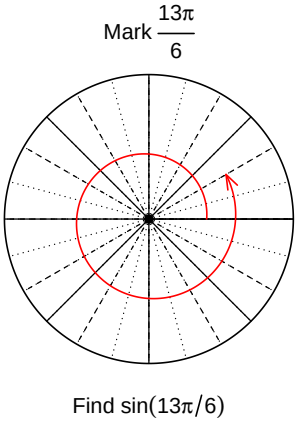
$r = 19.15$ meters.

Question 2

Consider angles $\frac{-9\pi}{4}$ and $\frac{13\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-9\pi}{4}\right)$ and $\sin\left(\frac{13\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(-9\pi/4)$



Find $\sin(13\pi/6)$

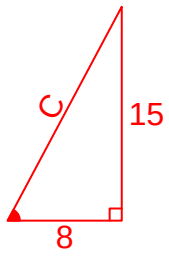
$\cos(-9\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(13\pi/6) = \frac{1}{2}$

Question 3

If $\tan(\theta) = \frac{-15}{8}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.

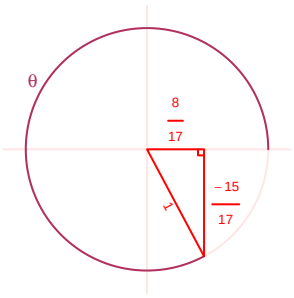
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$8^2 + 15^2 = C^2$$
$$C = \sqrt{8^2 + 15^2}$$
$$C = 17$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.



$$\sin(\theta) = \frac{-15}{17}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 5.97$ meters, an amplitude of 2.2 meters, and a frequency of 7.41 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -2.2\cos(2\pi 7.41t) + 5.97$$

or

$$y = -2.2\cos(14.82\pi t) + 5.97$$

or

$$y = -2.2\cos(46.56t) + 5.97$$